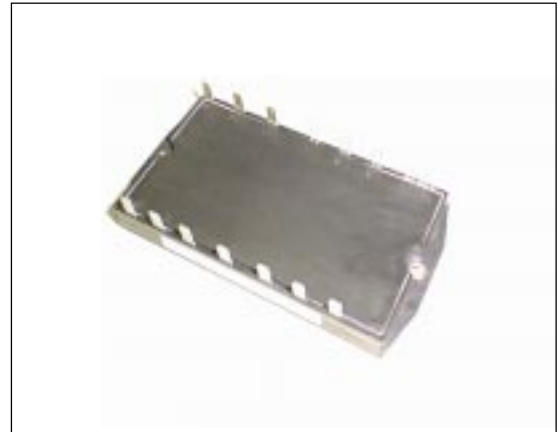


### IGBT MODULE

600V / 30A / PIM



#### ■ Features

- High Speed Switching
- Voltage Drive
- Low Inductance Module Structure
- Converter Diode Bridge Dynamic Brake Circuit

#### ■ Applications

- Inverter for Motor Drive
- AC and DC Servo Drive Amplifier
- Uninterruptible Power Supply

#### ■ Maximum ratings and characteristics

● Absolute maximum ratings (Tc=25°C unless without specified)

Item	Symbol	Condition	Rating	Unit	
Inverter	Collector-Emitter voltage	V <sub>CES</sub>	600	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	I <sub>C</sub>	Continuous	30	A
		I <sub>CP</sub>	1ms	60	A
		-I <sub>C</sub>		30	A
Collector power dissipation	P <sub>C</sub>	1 device	120	W	
Brake	Collector-Emitter voltage	V <sub>CES</sub>	600	V	
	Gate-Emitter voltage	V <sub>GES</sub>	±20	V	
	Collector current	I <sub>C</sub>	Continuous	30	A
		I <sub>CP</sub>	1ms	60	A
	Collector power dissipation	P <sub>C</sub>	1 device	120	W
	Repetitive peak reverse voltage	V <sub>R<sub>RRM</sub></sub>		600	V
	Average forward current	I <sub>F(AV)</sub>		1	A
Surge current	I <sub>FSM</sub>	10ms	50	A	
Converter	Repetitive peak reverse voltage	V <sub>R<sub>RRM</sub></sub>	800	V	
	Non-Repetitive peak reverse voltage	V <sub>R<sub>RSM</sub></sub>	900	V	
	Average output current	I <sub>O</sub>	50Hz/60Hz sine wave	50	A
	Surge current (Non-Repetitive)	I <sub>FSM</sub>	T <sub>J</sub> =150°C, 10ms	350	A
	I <sup>2</sup> t (Non-Repetitive)		T <sub>J</sub> =150°C, 10ms	648	A <sup>2</sup> s
Operating junction temperature	T <sub>J</sub>		+150	°C	
Storage temperature	T <sub>stg</sub>		-40 to +125	°C	
Isolation voltage	V <sub>iso</sub>	AC : 1 minute	AC 2500	V	
Mounting screw torque			1.7 * <sub>1</sub>	N·m	

\*<sub>1</sub> Recommendable value : 1.3 to 1.7 N·m (M4)

### ● Electrical characteristics (Tj=25°C unless without specified)

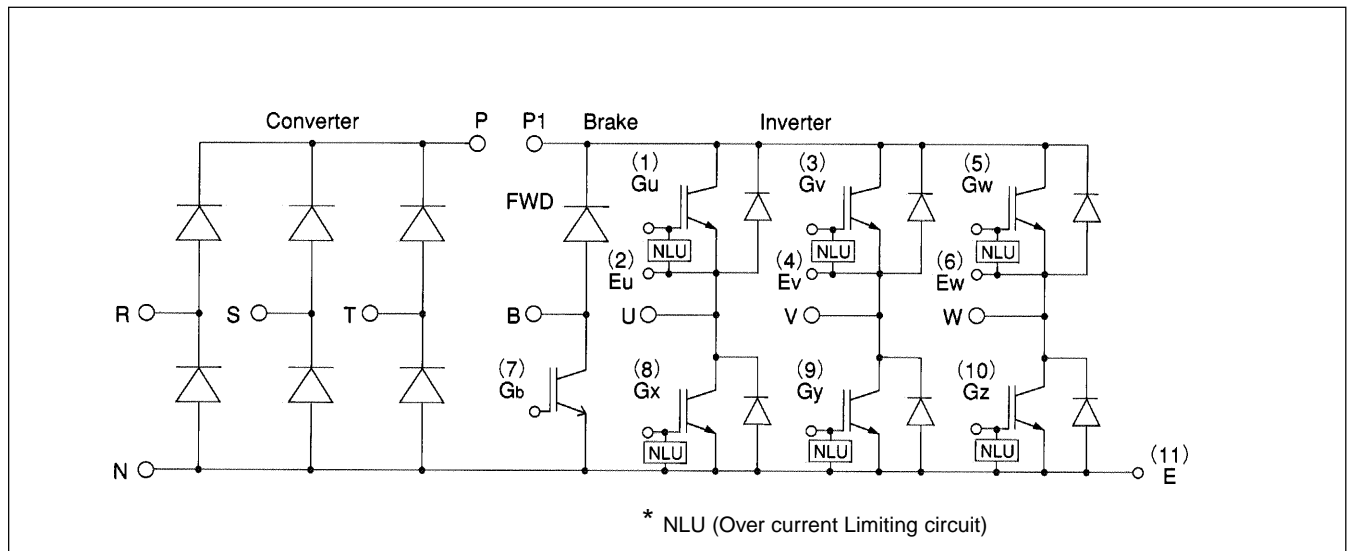
Item	Symbol	Condition	Characteristics			Unit	
			Min.	Typ.	Max.		
Inverter (IGBT)	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V			1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			20	μA
	Gate-Emitter threshold voltage	VGE(th)	VCE=20V, Ic=30mA			4.5	V
	Collector-Emitter saturation voltage	VCE(sat)	VGE=15V, Ic=30A			2.8	V
	Collector-Emitter voltage	-VCE	-Ic=30A			3.0	V
	Input capacitance	Cies	VGE=0V, VCE=10V, f=1MHz			1980	pF
	Switching time	ton	VCC=300V			1.2	μs
		tr	Ic=30A			0.6	μs
		toff	VGE=±15V			1.0	μs
		tf	RG=82 ohm			0.35	μs
Reverse recovery time of FRD	trr	IF=30A			0.3	μs	
Brake (IGBT)	Zero gate voltage collector current	ICES	VCE=600V, VGE=0V			1.0	mA
	Gate-Emitter leakage current	IGES	VCE=0V, VGE=±20V			0.1	μA
	Collector-Emitter saturation voltage	VCE(sat)	Ic=30A, VGE=15V			2.8	V
	Switching time	ton	VCC=300V			0.8	μs
		tr	Ic=30A			0.6	μs
		toff	VGE=±15V			1.0	μs
tf		RG=82ohm			0.35	μs	
Brake (FWD)	Reverse current	IRRM	VR=600V			1.0	mA
	Reverse recovery time	trr				0.6	μs
Converter	Forward voltage	VFM	IF=50A			1.55	V
	Reverse current	IRRM	VR=800V			1.0	mA

### ● Thermal Characteristics

Item	Symbol	Condition	Characteristics			Unit
			Min.	Typ.	Max.	
Thermal resistance ( 1 device )	Rth(j-c)	Inverter IGBT			1.04	°C/W
		Inverter FRD			2.22	
		Brake IGBT			1.04	
		Converter Diode			2.10	
Contact thermal resistance *	Rth(c-f)	With thermal compound		0.05		

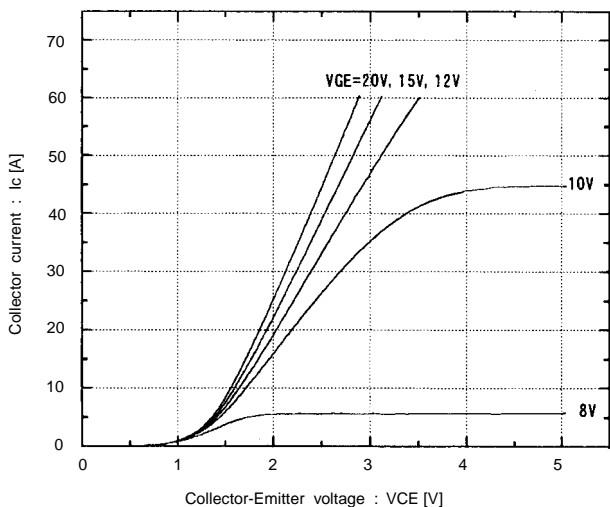
\* This is the value which is defined mounting on the additional cooling fin with thermal compound

### ■ Equivalent Circuit Schematic

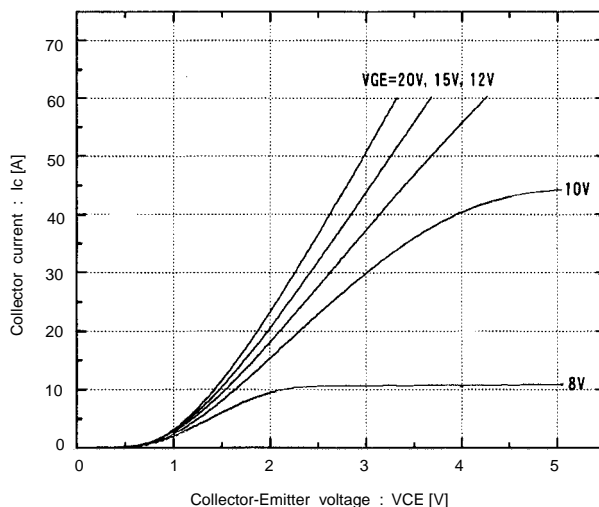


■ Characteristics (Representative)

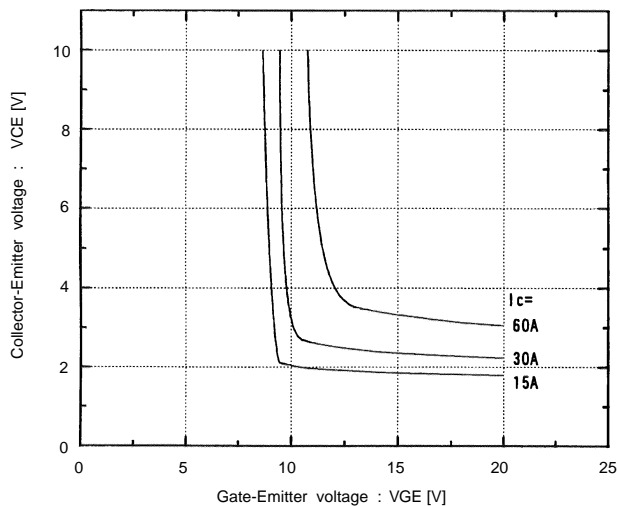
Collector current vs. Collector-Emitter voltage  
T<sub>J</sub>=25°C



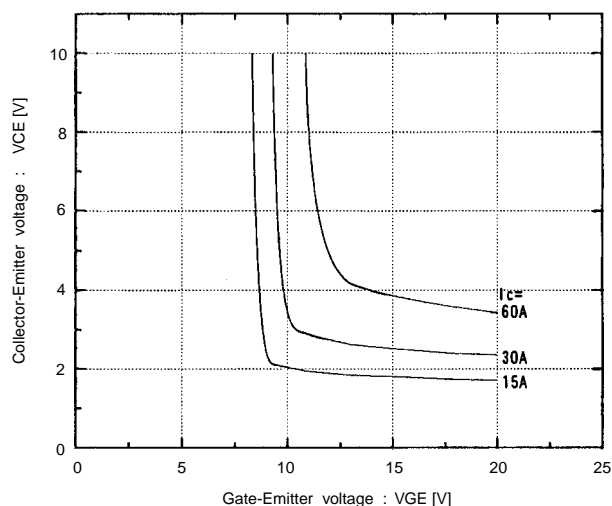
Collector current vs. Collector-Emitter voltage  
T<sub>J</sub>=125°C



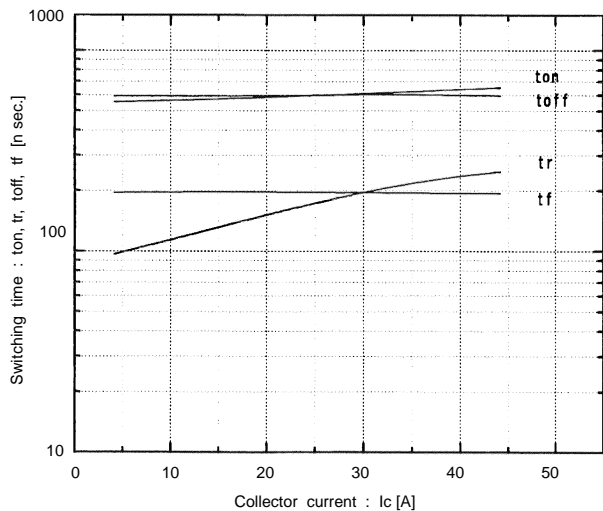
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>J</sub>=25°C



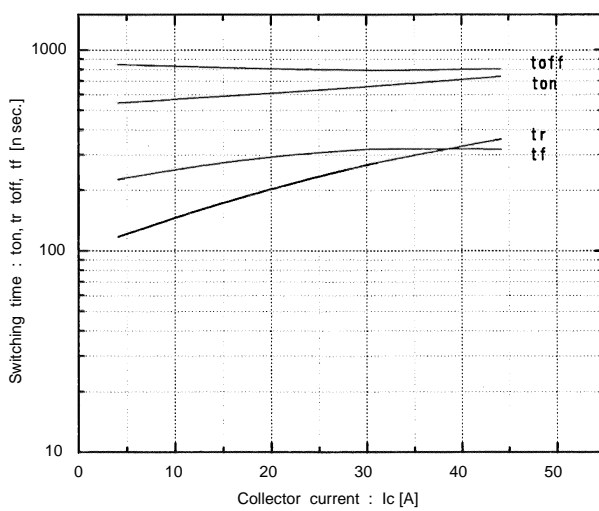
Collector-Emitter vs. Gate-Emitter voltage  
T<sub>J</sub>=125°C



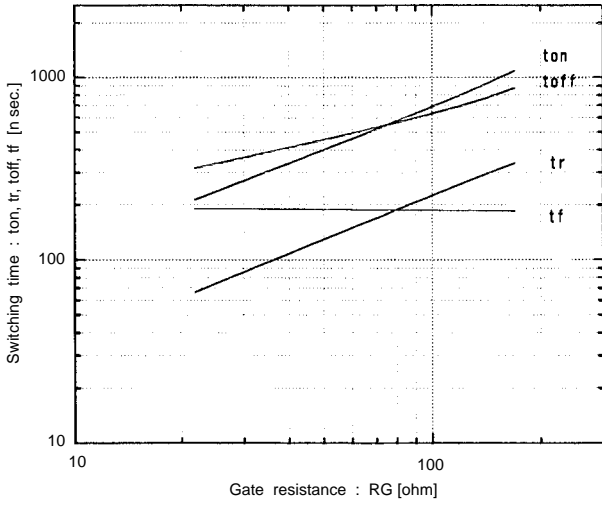
Switching time vs. Collector current  
V<sub>CC</sub>=300V, R<sub>G</sub>=82 ohm, V<sub>GE</sub>=±15V, T<sub>J</sub>=25°C



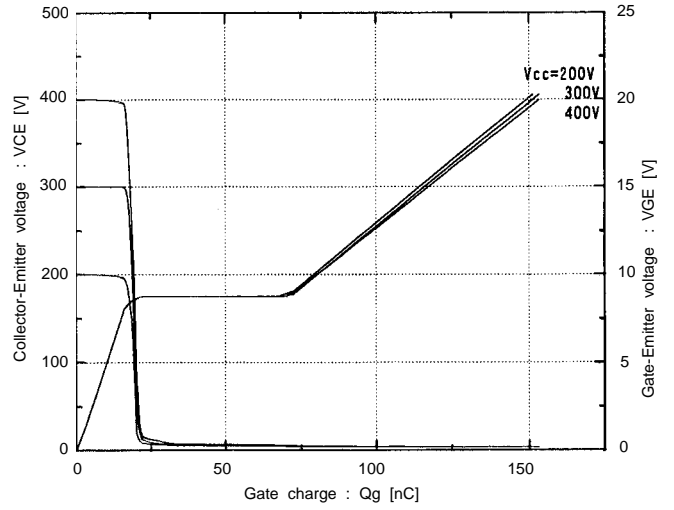
Switching time vs. Collector current  
V<sub>CC</sub>=300V, R<sub>G</sub>=82 ohm, V<sub>GE</sub>=±15V, T<sub>J</sub>=125°C



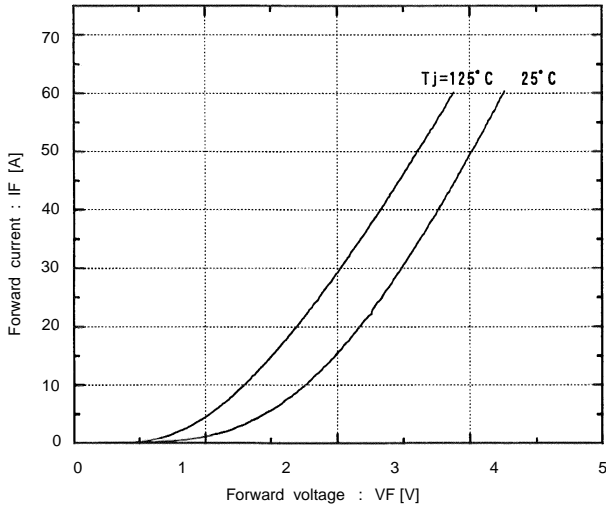
Switching time vs. RG  
 $V_{cc}=300V, I_c=30A, V_{GE}=\pm 15V, T_j=25^\circ C$



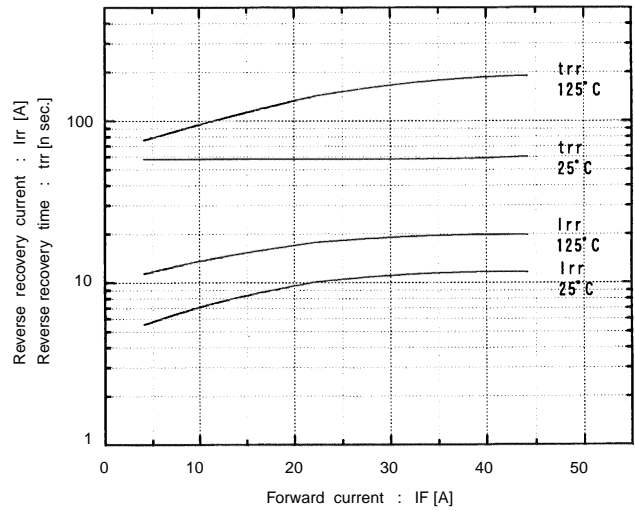
Dynamic input characteristics  
 $T_j=25^\circ C$



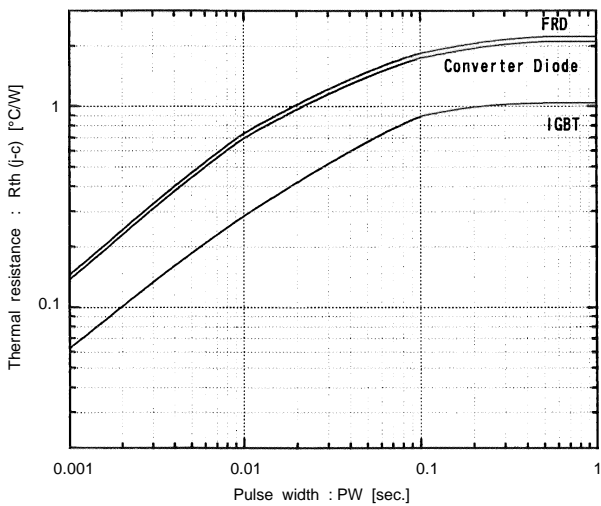
FWD  
 Forward current vs. Forward voltage  
 $V_{GE}=0V$



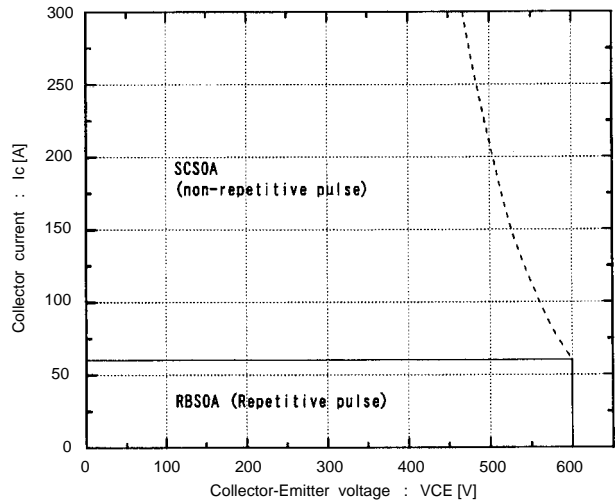
Reverse recovery characteristics  
 $trr, I_{rr}$  vs.  $I_F$



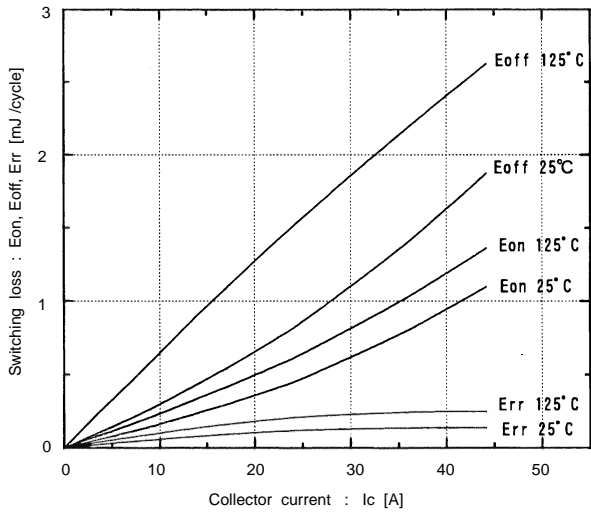
Transient thermal resistance



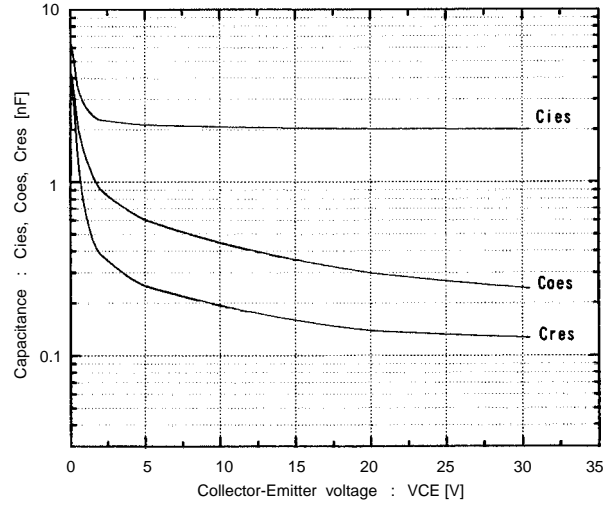
Reversed biased safe operating area  
 $+V_{GE}=15V, -V_{GE} \le 15V, T_j \le 125^\circ C, R_G \ge 82 \text{ ohm}$



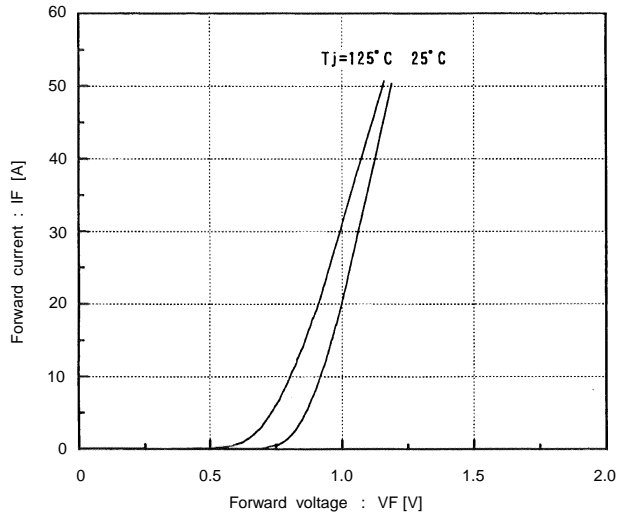
Switching loss vs. Collector current  
 $V_{cc}=300V, R_G=82\text{ ohm}, V_{GE}=\pm 15V$



Capacitance vs. Collector-Emitter voltage  
 $T_j=25^\circ C$



Converter Diode  
 Forward current vs. Forward voltage



■ Outline Drawings, mm

